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OF CEYLON

THE TEA RESEARCH INSTITUTE,
St. Coombs, Talawakelle,
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THE TEA QUARTERLY

VOLUME XXV MARCH, 1954 PART I

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* A PRELIMINARY REPORT ON THE COMMERCIAL EXPERIMENT OF MECHANICAL HARVESTING OF TEA ON DICKWELLA ESTATE.

B. D. Fay

(Dickwella Estate, Hali Ela.)

Introduction.

Previous small scale experiments on the mechanical harvesting of tea[1] showed so much promise that in 1951 it was decided to lay down a full scale commercial experiment on Dickwella Estate.

A 52 acre field was selected for the experiment. It was pruned in October, 1951, possibly rather harder than was advisable, with the result that crop, in the early months after recovery, was unduly depressed. It has subsequently been mechanically plucked, except for the first tipping which was done by hand. It is proposed, conditions permitting, to run the field on a four year pruning cycle, as was done in its last pruning cycle (1947 — 1951) when, of course, all harvesting was done by hand. Wherever possible comparative figures relative to yields, etc. are given for each of the two cycles. It will be noted that the present cycle is 27 months old, so that only the first 27 months of the previous cycle are used for comparison.

Machines.

Initially, six knapsack or independently driven croppers and six electric machines, driven from a common power course, were used. Subsequently in August 1952, the six electric croppers were discarded and replaced by six additional machines of the knapsack type, making 12 in all. The inclusion of any electrically powered machines has an important bearing on costs, as they are not as productive as the knapsack croppers.

A complete cropper can be divided into three components, the power unit, transmission, and harvester proper. The knapsack type of independently driven cropper only need be dealt with here. The power unit, a small portable engine, is supplied by an outside firm, whereas the Tarpen Engineering Co. Ltd., is responsible for the transmission (a flexible drive) and the actual harvester. Both the latter can now be considered very reliable as they have given no serious trouble for a long time. Unfortunately the same cannot be said of the power unit, which will require substantial modifications before it can be said to have acquired the standard of efficiency reached in the other two components.

In spite of this handicap, on-the-spot alterations and competent servicing of the engines in the field have kept them running more or less satisfactorily. However, the power unit must be more ruggedly constructed and inherent faults such as oil seepage on to the clutch belts overcome, better contact points must be fitted and gravity fed carburettors supplied as standard etc. before the goal of high efficiency is reached. None of these problems is insurmountable, having in mind the very high performance obtained by like engines employed on far more arduous duties.

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* The Institute does not necessarily endorse the views expressed in papers contributed by persons other than members of the Staff.

Labour and Costs.

For a long time a daily bonus of 45% extra basic pay for attendance only was paid, plus a piece rate bonus of-/03 cts per pound for any leaf harvested over a set poundage (50 lbs per labourer). The former was totally abused and nullified the attraction of the latter. Eventually the attendance bonus had to be stopped some eight months ago and the piece rate bonus left unchanged. Results improved enormously after the labour had settled down to the revised conditions of service, costs being reduced from 30.00 cts. per pound to 24.00 cts. per pound, although each labourer could and still does earn handsome over-pay, even though cropping conditions are not at their best.

A practical system of payment on the ratio of pounds harvested to acreage covered still remains to be worked out, but this cannot be finalised until the machines are perfected and will, in any case, have to be varied in its application to individual fields.

Finally, the vexed question of coarse leaf has to be dealt with, which necessitates strict supervision and insistance on the desired standard. This requirement, however, is not peculiar to mechanical plucking.

Mechanical plucking averages and costs to date are shown in Tables 1 and 2, but it must be emphasised that the costs given do not include depreciation or repairs. It would be unfair to incorporate these at this stage as they will decrease as efficiency increases. Even the makers of the engine have not indicated its expectancy of life. However, if they are taken to be say 25% the extra cost is only 5.62 cts. per lb. to date.

Table 1. *Mechanical plucking averages.*

	1952	1953	Total this cycle
Number of machines	12	12	12
Average number of hours worked per machine	1101	1214	2315
Green Leaf harvested lbs.	184,760	234,341	419,101
Average harvested per machine lbs. Average harvested per labourer lbs.	112 56	140½ 65½	126 61
Labourers per acre	2.8	2.8	2.8

Table 2. *Costs of last* 18 *plucks without enhanced rate of* -/50 *cents per labourer.*

	Cts. per lb. made tea
Labour	16.58*
Petrol	6.45
Oil	.91
	23.94

* The comparative figure here is 23.81 cts. per pound for labour on hand plucking.

Agricultural Aspects.

The tea under mechanisation continues to improve in spread and density to such an extent as to make passage through it difficult and the field presents an almost unbroken sheet of tea undulating to every contour and steep or gentle slope.

The accurate slope plucking and increased spread obtained by mechanisation have reduced wind damage, and weed growth, making for better soil, more efficient crop protection (blister blight) and reduced weeding costs. Estate account weeding for the last 15 months is 33% more expensive for hand plucked fields than for the machine plucked area. The respective figures are 4.5 workers per acre and 3.5 workers per acre.

There is no significant difference in the total yields for the first 27 months of the two cycles, (Tables 3 and 4) but a firm conclusion cannot, I think, be drawn until the experiment is concluded, although an analysis of results to date is interesting. It will be seen that hand plucked crop exceeded machine in the first 12 months, probably due to the heavy prune before mechanisation. This increase was overtaken and passed in the next 12 months, but in the final three was again lost. However, there appears no doubt that the mechanised yield will go ahead substantially in the next six months at least.

Table 3. *Upper Division Field No.* 9 — 52 *acres This cycle* (*Mechanical plucking*) *October* 1951 *to December*, 1953.

		Rainfall W/days	Rainfall R'fall	Yield per acre Month		Yield per acre To-date	Manure Nitrogen lbs. p. acre
1	October '51	13	6.60	—		—	
2	November '51	23	12.66	—		—	
3	December '51	20	11.73	—		—	28
4	January '52	23	12.81	—		—	
5	February '52	10	4.32	83		83	
6	March '52	11	6.91	91		174	
7	April '52	24	16.17	122		296	40
8	May '52	18	7.59	118		414	
9	June '52	5	.55	119		533	
10	July '52	5	2.55	111		644	
11	August '52	5	1.85	70		714	
12	September '52	9	4.17	**44**	**758**	758	
13	October '52	6	3.66	170		928	
14	November '52	19	6.64	60		988	40
15	December '52	20	7.92	70		1058	
16	January '53	20	9.32	42		1100	
17	February '53	13	4.55	29		1129	
18	March '53	11	3.99	194		1323	
19	April '53	24	11.45	78		1401	68
20	May '53	1	.04	182		1583	
21	June '53	10	2.40	101		1684	
22	July '53	22	6.90	119		1803	
23	August '53	8	2.96	145		1948	
24	September '53	7	2.47	**129**	**1319**	2077	
25	October '53	23	14.98	85		2162	
26	November '53	11	7.03	108		2270	72
27	December '53	26	14.16	**65**	**258**	2335	
		387	186.38	2335		2335	248

Table 4. *Upper Division Field No. 9 — 52 acres Last cycle (Hand plucking) July 1947 to September, 1949**

	Rainfall W/days	Rainfall R'fall	Yield per acre Month	Yield per acre	Yield per acre Todate	Manure Nitrogen Lbs.p. acre
1 July '47	11	5.74	—		—	
2 August '47	15	8.60	—		—	
3 September '47	6	.85	—		—	
4 October '47	17	11.14	35		35	
5 November '47	12	2.65	61		96	
6 December '47	18	9.15	40		136	33
7 January '48	19	5.59	49		185	
8 February '48	3	.85	75		260	
9 March '48	7	1.49	119		379	
10 April '48	20	6.59	90		469	35
11 May '48	15	7.23	167		636	
12 June '48	4	.43	**160**	**796**	796	
13 July '48	8	3.50	97		893	
14 August '48	5	1.62	120		1013	
15 September '48	3	.90	81		1094	
16 October '48	18	10.22	63		1157	30
17 November '48	21	6.70	126		1283	
18 December '48	22	13.33	81		1364	
19 January '49	18	7.99	20		1384	
20 February '49	6	2.99	48		1432	
21 March '49	3	2.74	172		1604	30
22 April '49	15	6.47	130		1734	
23 May '49	7	1.11	159		1893	
24 June '49	6	.56	**107**	**1204**	2000	
25 July '49	15	3.99	79		2079	
26 August '49	13	9.00	134		2213	
27 September '49	9	3.17	**129**	**342**	2342	
	316	134.60	2342		2342	128

* Full cycle completed September 1951.

Admittedly manuring has been on a more generous scale, but the increase in the size of the bushes has in itself necessitated the additional plant food. Total rainfall has increased this cycle, but distribution of rain, the relevance of age from pruning to the rush seasons, and the incidence of blister blight are factors difficult to assess at this stage.

To sum up, it is safe to conclude that mechanical cropping effects a great improvement in a field of tea, at any rate in its early stages of recovery from pruning, and the advantage therefrom cannot be over-emphasised.

It has been observed recently that extra long plucking rounds are inadvisable and that the best results appear to be obtained at 10 to 12 day rounds, or at shorter intervals in rush periods.

Two factors, which can only be determined later are, how long the field will run before pruning becomes necessary and the best method of pruning then to be adopted.

Manufacture

Given insistence on reasonable standards of leaf, there are no difficulties in manufacturing mechanically harvested leaf, and quality is fully up to the standard achieved from hand plucked leaf. Appearance is the first to suffer in poor mechanisation.

Sales

An invoice of tea, No. 22, was made up wholly from mechanically plucked leaf and despatched anonymously for sale at the Colombo auctions last April, and subsequently a further Invoice, No. 41, was sent to London in June. The reports on these Invoices are reproduced below:—

Report on Invoice 22 (*Colombo*)
Harvested between 15*th March and* 15*th April*, 1953
Date of Sale 25/5/53

		Val.	*Sale*	*Avg.*	*Colombo Market Avg. for that sale medium grown tea*
B. O. P. Liquors:—	Useful strength & colour.				
Grading:—	Blackish, smallish, fairly even, a little stalk	1.80	1.80	1.78	1.70
B. O. P. F. „	Blackish, greying, rather mixed and fibry	1.75	1.70		

Report on Invoice 41 (*London*)
Harvested between 1*st May and* 15*th June*, 1953

	Valuation	*Sale*	*Avg.*	*London Market Avg. for that sale*
B. O. P.	3/10d - 3/11d	3/10d	3/11d.	3/10.61d.
B. O. P. F.	3/11d - 4/0d.	4/2¾d.		

Dry Leaf: B. O. P. is not as black or even in size compared to Invoice 40 and contains more stalk and fibre; B. O. P. F. is also not as even in size and contains a little more stalk and fibre.

Remarks: B. O. P. shows a marked fall in leaf appearance.

Liquors: Liquors, though still bright and pungent in cup, show a decline in quality and character, and are barely equal in strength and colour compared to the previous invoice.

Infused leaf: Not as bright.

It will be appreciated that factors outside the Management's control adversely affected these teas in that they came from a young field, were harvested during the non-quality season, and had to be stored for a long time in order to accumulate sufficient bulk (B.O.P. and B.O.P.F. grades only) to make up an invoice representing 72½% of the crop. It is not feasible yet to accumulate other grades so as to submit 100% for sale at one time, but it is apparent from the prices realized, both in Colombo and London, that values are well maintained. Any hypothetical decline is off-set when mechanical costs are compared with those prevailing on most estates now-a-days. The position is stronger still when it is realised that labour on mechanised harvesting costs only 17 cents per pound and absorbs only 2.8 labourers per acre.

Conclusions

It is still too early to dogmatize but in my opinion, mechanical cropping of tea must eventually take the place of manual methods. Its advantage in improving agricultural conditions alone makes its use imperative as a method of harvesting early in the pruning cycle, and once an efficient power unit is obtainable rising labour costs will compel its widespread use.

Reference

(1) Fay, B. D.—The Mechanical Plucking of Tea. *Tea Quarterly*, XXI, Parts II & III, p. 38, 1950.

* NOTES ON STYLOSANTHES GRACILIS (BRAZILIAN LUCERNE) AS A GROUND COVER FOR TEA

G. L. Heaton

Stylosanthes gracilis is a perennial legume, rich in protein, hitherto grown as a valuable fodder crop. It is quite prostrate and this combined with its spreading habit makes it an ideal ground cover for tea. It is a magnificient soil and humus builder and greatly increases the earthworm population of the soil. It has a deep taproot but the runners only develop hairlike feeding roots, profusely nodulated, which enables the cover to be rolled back like a blanket. It will not wind into the tea and runners which grow up through the bushes can be easily pulled out from the base and laid in any required direction. When a thick cover is established weeds are completely suppressed and there is no wash or erosion. Control is cheap and simple.

Stylo can be grown from seed or cuttings and supplied to the tea either as seed, cuttings or nursery or basket plants. The methods of propagation and supply found to be the most satisfactory are as follows:—

Nurseries

Seed: One tablespoonful of seed to two or three double-handfuls of sand or fine earth gives a suitable concentration. The bed should be raked and the seed mixture spread on the surface and gently pressed down. We have found that if the seed is soaked for 12 hours or so before being put out, germination is quicker and if the beds are given a light sprinkling with "Gammexane" (or similar insecticide) about 10 days before use, loss of seedlings is minimised. The plants should be later thinned to 12" to 18" apart. These will form a thick cover in a few months and can be used as a permanent seed and cutting supply.

Cuttings: We have found the most successful way of propagating from cuttings is to take only the soft 4 or 5 inches at the terminal of the stems, just above a leaf. The stem of the cutting is inserted into a pencil sized hole to a depth of about 2 inches and firmed all round in the same way as a V.P. cutting or carnation slip. Cuttings must be kept moist until they have rooted.

Basket Plants. Seedlings should not be transferred to baskets until they are at least 2" high. Small baskets 3" × 5" are sufficient. Basket plants should not be put out to the tea until they are at least 6" high. (This also applies to basket cuttings.)

Planting in Tea

Seed: Two or three seeds put out on loosened earth between bushes and pegged give fairly satisfactory results in good soil. The chief difficulty is to prevent loss or damage during weeding operations until the plants become established.

Cuttings: One cutting should be planted between every two bushes or between alternate pairs of bushes. Damp, dull weather for a few days after putting out is important to success. Pegs as protection from weeders are essential.

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* *The Institute does not necessarily endorse the views expressed in papers contributed by persons other than members of the staff.*

Basket Plants. As already stated these should be at least 6″ high. This method of planting gives by far the best results, 100% success being usual. One plant to every second bush planted in a diamond pattern is quite adequate.

General Notes

The following general agricultural notes may be of interest and assistance.

Stylo is supplied in the tea rows and not between them. This prevents the tap root being damaged by or interfering with forking.

Fertilizer is applied by rolling back the stylo, broadcasting the fertilizer and replacing the stylo. The soil surface is thereby under perpetual cover. (The fertilizer can be raked in before replacing the cover if desired). A hooked stick or ¼″ iron rod (similar to a walking stick) 15″ long is used to remove runners from the base of the bushes. Where the cover is too thick or high it is slashed with a piece of hoop iron, in the same way as P. W. D. labourers slash grass by the roadside. One to two labourers per acre per month is sufficient for control. There is no weeding, as such, when once a thick cover is established. If the straight end of the control rod is flattened and pointed it is useful for rooting out any deep rooted weed or grass tuft which may show up before a complete cover is established. The absence of wash reduces draining costs considerably.

STUDIES IN BLISTER BLIGHT CONTROL

XIV. FURTHER STUDIES ON THE EVALUATION OF SOME COPPER FUNGICIDAL DUSTS IN THE CONTROL OF BLISTER BLIGHT.

C. A. Loos.

In a recent publication Loos (1) evaluated the efficiency of a number of copper containing fungicidal dusts, applied through the 'Orient' rotary hand duster, in the control of the blister blight disease of tea. Those evaluations indicated that 2 per cent. copper dust formulations, applied at 10 lbs per acre at 5 day intervals, gave indifferent control of the disease. Of the 4 per cent. copper dusts tested Messrs. Universal Crop Protection Ltd.'s 'Cuprosana', applied at 5 lbs per acre at 5 day intervals showed promise of adequate blister blight control under normal monsoonal weather conditions. The degree of protection afforded was, however, inferior to that of spraying with 'Perenox' at 6 ounces per acre at 10 day intervals. Our recommendations, up to the present time, for dusting in the control of blister blight disease of tea have, therefore, been confined to the suggested use of 'Cuprosana' 4 per cent. dust at application rates of 5 lbs per acre at 5 day intervals.

In 1953 we were offered, for test purposes, four proprietary 4 per cent. copper dusts, specially formulated for blister blight control. The results of the tests are described in this article.

The four proprietary copper dust formulations tested were:—

(1) 'Blidust' manufactured by Messrs. Pest Control Ltd. and supplied through Messrs. Mackwoods Ltd., Colombo.

(2) 'Perecloud' manufactured by Messrs. Plant Protection Ltd. and supplied through Messrs. Imperial Chemical Industries Ltd., Colombo.

(3) 'Strawson's Copper Dust' manufactured by Messrs. Strawson Chemical Co. Ltd. and supplied through Messrs. James Finlay & Co. Ltd., Colombo.

(4) 'C.C.C. Dust'. Origin not disclosed, but supplied through Messrs. Colombo Commercial Company Ltd., Colombo.

The above formulations and 4% "Cuprosana" were applied through the 'Orient' rotary hand duster at 5 lbs per acre at two application intervals of 5 and 10 days. A comparative evaluation of the degree of blister blight protection afforded by the dusts and by wet spraying with 'Perenox', at a concentration of 4 ounces in 10 gallons of water applied at 15 gallons per acre, was made against the incidence of blister on unprotected plots.

Experimental Plots.

I have to record my thanks to the Superintendent of Mattakelle Estate and his Agents, Messrs. Boustead Bros. Ltd., for making available, for experimental purposes, a seven acre block of tea on the Cairness Division of Mattakelle Estate, Talawakelle. The area, which was the site of the 1951 dust evaluation trials, was a field in its first year from pruning. Seven half-acre plots (300 × 72½ ft) were fenced leaving 20 feet bands of tea between the plots. These bands, which served as guard bands between treated plots, and the considerable amount of tea above and below the plots were left unprotected throughout the experiment. This, while permitting an undisturbed build up of blister blight around the experimental plots, provided conditions favourable to the assessment of the fungicidal value of the products under test. The test was undoubtedly a severe one, but it should be borne in mind that adequate control, under conditions where blister blight spores are present continually and in considerable numbers, gives promise of a proportionately higher degree of efficiency under conditions less favourable to the disease.

Dusting by means of the 'Orient' rotary hand duster was done across 18 feet bands, either along or across the rectangular plots in accordance with wind direction at the time of dusting. Every effort was made to give the plots as even a cover as possible.

Experimental Results

The experiment commenced on June 10th. 1953, and ceased on September 30th. 1953. The entire experimental block, at the commencement of the trials, was free of blisters following the long drought from May to early June, during which period only 0.48 inches of rain fell over 34 days. Blister evaluations were made inside a band 18 feet wide in the centre of the plots to avoid any possible doubt of mixed dust contamination and, hence, enhanced control. The most severe attack of blister blight was observed during the second week of September when the unprotected plot showed numerous infections on leaves and die-back of plucking shoots following stem infections.

Observations were made on September 15th (Table I) using a scale of ascending numbers 0 - 6 to assess the degree of infections on leaves and as die-back of plucking shoots. Those two figures were then averaged and matched against an arbitrary scale of descriptive terms such as poor, good, fair, etc.

The two scales show therefore:—

A — Values of blister infections (leaf infections and die-back of plucking shoots).

B — Arbitrary descriptive scale of the degree of protection afforded by the particular treatment (dust, wet spray or unprotected).

Table I. *Comparative trials with 4 per cent copper fungicidal dusts in the control of blister blight on Mattakelle Estate.*

A. Key to figure assessments:—

0	=	No infection.
1	=	Slight infection on leaves.
2	=	Fairly heavy infection on leaves.
3	=	Very heavy infection on leaves.
4	=	Die-back light.
5	=	Die-back severe.
6	=	Total loss of plucking shoots.

B. Key to arbitrary scale of protection based on averages of figure assessment :—

0 - 1	=	Excellent
1	=	Very Good.
1 - 2	=	Good.
2	=	Fairly Good.
2 - 3	=	Very fair.
3	=	Fair
3 - 4	=	Indifferent.
4	=	Poor.
More than 4	=	Very Poor.

Assessment on 15th September, 1953.

Formulation	Treatment	Assessment	Average	Arbitrary Assessment
Blidust	5 lbs. every 5 days	2 - 1	1.5	Good
Cuprosana	5 lbs. every 5 days	2 - 4	3.0	Fair
Strawson's Copper dust	5 lbs. every 5 days	2 - 4	3.0	Fair
C.C.C. Dust	5 lbs. every 5 days	2 - 4	3.0	Fair
Perecloud	5 lbs. every 5 days	2 - 1	1.5	Good
Blidust	5 lbs. every 10 days	2 - 4	3.0	Fair
Cuprosana	5 lbs. every 10 days	3 - 5	4.0	Poor
Strawson's Copper Dust	5 lbs. every 10 days	3 - 5	4.0	Poor
C.C.C. Dust	5 lbs. every 10 days	2 - 5	3.5	Indifferent
Perecloud	5 lbs. every 10 days	2 - 4	3.0	Fair
Perenox	6 ounces per acre as spray at 10 day intervals	0 - 1	0.5	Excellent
Unprotected		3 - 5	4.0	Poor

Discussion

In the arbitrary scale of descriptive terms an attempt has been made to fix what may be considered "adequate" protection. Protection classed below fair should be considered as not worthwhile or uneconomic. All dust formulations used in this experiment may, therefore, be considered to have given adequate protection against blister blight at application rates of 5 lbs. dust per acre at 5 day intervals, while two of the formulations 'Blidust' and "Perecloud" gave control superior to that of the other formulations.

'Blidust' and 'Perecloud' proved to be the most efficient of the dusts tested at application rates of 5 lbs. per acre at 10 day intervals while 'Cuprosana', 'C.C.C. Dust' and 'Strawson's Copper Dust' have to be considered as not worthwhile or uneconomic at that application rate and interval. Spray protection on the other hand may be considered as ideal protection giving almost total control of the disease with applications of 4 ounces in 10 gallons water at 15 gallons per acre every 10 days.

Reference

(1) Loos, C. A.—Studies in blister blight control. X. Evaluations of some copper containing fungicidal dusts in the control of blister blight disease of tea. "*Tea Quarterly*", Vol. XXIII. Part 1, March 1952, pp. 6 - 11

STUDIES IN BLISTER BLIGHT CONTROL

XV. "BLIDUST" TRIALS UNDER NORTH-EAST MONSOONAL CONDITIONS IN UVA.

C. A. Loos.

Following trials in the South West Monsoon reported in the previous paper of this series, facilities were offered for further trials with 4% Blidust during the North East Monsoon in the Uva District.

The experiment which commenced on 10th October, 1953, and ended on 16th February, 1954, consisted of identical treatments on each of two fields. The treatments and acreages involved were as follows:—

Field No. 2.	54 acres (pruned January 1953)	
Plot A.	Dusted with "Blidust" at 5 lbs. per acre at 8 day intervals	26 acres
Plot B.	Sprayed with "Blitox Spray" every 8 days at application rates of approximately 15 gallons per acre with the fungicide at 4 ozs. in 10 gallons of water ...	26 acres
Plot C.	Unprotected ...	2 acres
Field No. 7.	38 acres (Pruned July 1952)	
Plot A.	"Blidust" applied as for field No. 2. ...	35 acres
Plot B.	Sprayed with "Blitox Spray" applied as for field No. 2	1 acre
Plot C.	Unprotected. ...	2 acres

Dusting was done through the 'Orient' rotary hand duster, the dust being distributed over bands of 5 rows.

Weather Conditions

Although the average rainfall in October to the middle of December was normal in comparison with previous years there were intermittent periods of rainless days in October and November. In November the periods 3rd. to 10th. and again 19th. to 23rd. were rainfree. During those months rain fell mostly in the evenings while the mornings were bright and sunny. From about the middle of December to the middle of February weather condiditons were more favourable to blister blight as rain and mist persisted almost throughout the day.

Experimental Results.

The final assessment of blister incidence on the experimental plots was made on February 16th. The weather, for at least nine weeks previous to that date, was particularly favourable to blister blight infection and of sufficiently long duration for a build up of severe infections on the unprotected areas.

Assessments on the two fields were as follows:—

Field No. 2	*Treatment*	*Protection*
Plot A	'Blidust' dusted	Good
Plot B	'Blitox Spray'	Excellent
Plot C	Unprotected	Poor

Field No. 7	*Treatment*	*Protection*
Plot A	'Blidust' dusted.	Good.
Plot B	'Blitox Spray'	Excellent
Plot C	Unprotected	Poor

In both fields, bushes in the sprayed areas carried a few leaf blisters only. There was no die-back of plucking shoots. The dusted areas showed a fairly heavy incidence of leaf blisters while occasional bushes showed die-back of plucking shoots following stem infections. In comparison the unprotected plots showed evidence of a recent severe attack of leaf blisters and stem infections which had caused a considerable amount of die-back of plucking shoots.

Discussion

The results of the trials described above, coupled with the findings of the previous South West Monsoon trials described in the previous article, suggest that Blidust, under all conditions except those obtaining in prolonged periods of rain and mist, affords a degree of protection comparable to that given by wet spraying.

As a short term protection policy, particularly suited to areas subject to the North East Monsoonal rains only, application of Blidust at the rate of 5 lbs. every 8 days appears to be quite sound. During periods of weather exceptionally favourable to blister blight attack the period between applications should be reduced. In reducing the period between applications thought must be given to the subject of copper residues as it is unwise to apply dust less than three days before plucking. Such a short interval assumes that heavy rainfall will wash off the greater part of the dust. Short intervals under low rainfall conditions must be avoided.

Under weather conditions liable to cause heavy and prolonged attacks of blister blight, wet spraying is still strongly recommended.

Acknowledgments

Messrs. Harvey and Woods of Uva Highlands Estate conducted the spraying and dusting throughout the experiment. I wish to record my thanks for the very efficient way in which all the operations were carried out.

Reference

1). Loos, C. A. Studies in blister blight control. XIV. Further studies in the evaluation of some copper fungicidal dusts in the control of blister blight. "*Tea Quarterly*" Vol. XXV. Part 1, March 1954, pp. 17—19.

POWER CHARGING OF KNAPSACK SPRAYERS

J. Landreth.

A power operated charge pump unit tested out on St.Coombs Estate during the past six months has proved to be highly satisfactory.

Since a considerable amount of labour and time is expended in charging knapsacks by hand-operated pumps, especially when nozzles having outputs of up to 20 gallons per hour at the normal knapsack working pressures are used, the advantages of power charging are obvious. The daily spraying task on St.Coombs requires 600 gallons of water and since the tank on the unit has a capacity of 200 gallons a tractor must be available at specified times to move the unit to points convenient for re-filling and for operating. Although the tractor is used mainly for leaf transport no difficulty has been experienced in co-ordinating the two duties.

The unit consists of a channel iron chassis fitted with axle, wheels and brakes. The brake lever is positioned for operation from the tractor seat. The fore-end of the chassis is designed for use with the automatic hitch assembly on a Ferguson tractor. Mounted on the chassis is a 200 gallon tank and a pumping group. A framework, fitted with base blocks and straps to position each knapsack, surrounds three sides of the tank. The number of knapsacks carried is 16. A metal tray is fitted on top of the tank to carry hoses and lances, also a 3 gallons mixer for the fungicide. The pump and motor were supplied by Messrs. Cooper, Pegler & Co. Ltd., England and their specification is as follows:—

* Charging Group No. 647

3 h.p. 4 stroke engine.
2 throw high pressure pump.
Output 6 gallons per minute.
Pressure up to 200 lbs. per square inch.
Belt driven.

This group, designed for charging batteries of "Favori-Colibri" knapsacks, consists of a powerful belt driven liquid pump and air compressor mounted on a strong chassis. It is fitted with handles for the mounting of bearers if necessary. The air compressor will charge one "Favori-Colibri" with up to 70 lbs. per square inch of air in two minutes.

The pump has six outlets enabling six "Favori-Colibri" to be charged simultaneously with liquid up to 170 lbs. per square inch in three minutes. The six outlets are arranged in two groups of three. By means of an instantaneous valve all six, or either three, can be closed as desired. Each charge hose is fitted with a tap and instantaneous bayonet joint, which prevent surplus liquid being wasted between the pump and the sprayers. A regulator and safety valve (adjusted before deapatch to give a working pressure of 170 lbs. per square inch) can be varied to give lower working pressures, if desired, and ensures the return to the tank of any surplus or unused liquid, for example when fewer than six "Favori-Colibri" sprayers are being charged at once. A readily accessible clutch throws the pump out of gear when it is only necessary for the air compressor to be in use.

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* Since writing the foregoing we have been advised that Charging Group No. 647 has been superseded by an improved version called the "Vitiver".

The unit is supplied with a 9'6" length of suction hose fitted with a strainer and a 9'6" length of return hose. The overall dimensions are:—

Length	38"
Width	24"
Height	25"

Several modifications were made to the standard pipelines to meet our particular requirements. On the suction side of the pump there are two hose connections. One of these was taken to a 100 mesh line strainer and a wheel valve fitted at the base of the fungicide tank. The other is fitted with a wheel valve and length of hose which can be inserted into a bucket or drum of clean water to facilitate washing of the pump and knapsacks at the end of a day's work. A pressure gauge has also been fitted to the air compressor which facilitates the topping up and checking of the air pressure in knapsacks not fitted with pressure gauges.

Petrol consumption is approximately half a gallon per 6 hour working day, when the machine is serving 12 sprayers. Since the machine was introduced the spraying labourers have covered approximately 3 acres each, per day.

General view of the new power charging unit now in use at St. Coombs. The knapsacks normally carried on the near-side of the tank have been removed to show fixing straps and charging units.

(*Photo* C. A. Loos)

MISCELLANEOUS NOTES

A NOTE ON POTASH MANURING.

G. B. Portsmouth

In the article on "Potash Deficiency in Tea" (*Tea Quarterly* Vol. XXIV, Part IV, December 1953) it is stated that on the main St. Coombs three factor manurial experiment the potash responses are greatly in excess of the nitrogen responses. Whilst this statement is completely true *under the conditions of this experiment*, it must not be taken to imply the necessity for any change in manuring policy with regard to potash.

As stated in the article these very large potash responses were obtained between the K_0 and K_{20} levels of manuring. This indicates that, over the 22 years during which the experiment has been in operation, the natural potash reserves in the soil of the K_0 plots have become very seriously depleted with the result that the bushes now show the potash deficiency symptoms illustrated. Under such conditions therefore very large responses to applied potash fertiliser are to be expected.

T.R.I. 500 mixture, however, when applied at the recommended rates, contains more than enough potash to replace all that removed in the crop and in the pruning wood. Accordingly, when this mixture is continually and correctly used, no depletion of the soil reserves of potash should occur and conditions under which very large responses to potash might be expected will not develop. There is thus no reason to alter the proportion of potash now incorporated in T.R.I. 500 mixture.

NOTES ON PATHOLOGICAL MATTERS

B. N. Webster

The Submission of Specimens.

The large amount of advisory work at present being undertaken by the Tea Research Institute necessitates this repetition of a previous request. There are many occasions when a little information regarding specimens sent to us for diagnosis would simplify our work considerably. We ask, therefore, that the following information be given regarding specimens in the given categories.

Dead or Diseased Bushes.

1) Whether isolated, or from a patch.
2) Length of time that the condition has been noticeable.
3) Soil type and drainage.
4) Proximity of shade trees (give species) or shade tree stumps.
5) Unusual climatic conditions (drought etc.)
6) Recent cultural operations (manuring, tipping, lopping or removal of shade, thatching etc.)
7) When last pruned.

General Poor Areas.

All the above information, and in addition the following.

8) Plucking rounds.
9) Yield and manuring records for the past two cycles.
10) Presence of Shot-hole borer.
11) Whether protected from Blister-blight.

Nursery Plants, Tea and Shade Trees.

Nos. 1, 2, 3, 5, & the following:

12) Condition and origin of soil—(patna, jungle, drains etc.)
13) Whether shaded or covered.
14) Whether spray protected.
15) Rainfall, or if watered artificially how frequently.

Soil Specimens and Insect Specimens.

As much of the above information as is considered relevant should be given, also the purpose of the examination if a fresh soil is sent.

In addition to the above information being required the following points should be borne in mind. Bushes suspected of root disease should always be completely enclosed to avoid dissemination of disease in transit. Whenever possible they should be sectioned down the centre. Each bush should bear an individual label, corresponding with a label placed on its site of removal from the field.

Leafy material, root and soil samples should always be packed in a damp condition in order that they may arrive in as fresh a condition as possible. This can easily be accomplished by the use of damp moss, plantain leaves etc. as packing material. Much the same applies to insect specimens, which should be packed with host plant material available, and always in rigid containers provided with ventilation holes.

The "Cercosporella" Disease.

Recent investigations into a 'corroded flush' symptom on tea in plucking, formerly attributed to the 'Cercosporella' disease, have shown a capsid bug, *Lygus viridanus* Motsch to be responsible. The bug feeds at night, and, shunning light vigorously, moves into the bottom of the bushes during the day. It feeds by means of a long proboscis which is inserted into the tender tissues of buds and very young leaves, sucking up sap. The insect's saliva is toxic, and at each puncture a number of cells are killed in addition to those actually penetrated, the toxins spreading through an area of about 1 mm. diameter in two or three hours. On freshly attacked flush (Figs. 1 & 2) these areas of dead cells appear as small brown shiny spots about 1 mm. in diameter. One bug, feeding overnight, may make up to twenty punctures on a single leaf.

When buds open, and the leaves enlarge as a result of cell expansion, no expansion takes place in the small areas of dead cells, leading to the formation of small holes in the more mature leaves (Figs. 3 & 4). When buds are attacked a favourite site for feeding punctures appears to be along the inrolled margin of the leaves, and when such leaves expand their margins are found to be wavy or "corroded" (Fig. 4).

Identical symptoms to those described have previously been attributed to the 'Cercosporella' disease fungus, *Calonectria theae* Loos, (1) but it has been found impossible to reproduce, under any conditions, the described symptoms using this fungus. All field outbreaks showing the corroded flush symptoms which have been examined by the writer have been found to be caused by the Lygus bug. Investigation of the true 'Cercosporella' disease continues however, and it is hoped that it will form the subject of a further note.

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Results of **Lygus viridanus** attack. Figures (1) and (3) show results of a natural attack in the field. Figures (2) and (4) show results of an experimental attack on pot plants; Figures (1) and (2) illustrate early stages and figures (3) and (4) later stages.

Control of the Lygus bug has been affected in the field by two means. A single round of spraying with 50% D.D.T. dispersible powder at a rate of 2 lb. to 30 - 50 gallons of water per acre has resulted in 60% - 80% control for a period of 3 months. Owing to increase in mite populations following D.D.T. spraying of tea (2) it is felt that control by means of shortened plucking rounds is the most desirable form. This method is based on the fact that the eggs of the Lygus bug are laid in the very young stems of tea, just behind the terminal bud. The exact length of the egg stage is not yet known, but plucking on rounds of ten days or less, thus removing unhatched eggs, has proved a successful means of control.

Grevillea Seedling Disease

A disease of Grevillea seedlings with which the fungus *Amphichaeta grevilleae* Loos was associated, was reported in 1948 (3) This disease has been found again and the fungus re-isolated. In infectivity trials the fungus has been found to be a vigorous parasite of young Grevillea plants under certain conditions. Leaves abraided by sand, particularly on plants under conditions of high humidity were most susceptible, but the fungus was found to be capable of entering undamaged leaves also.

Ideal conditions for this fungus are found in most exposed nurseries, where sand and soil splashed forcibly on to the plants damage the tissues, and where, during the monsoon, moisture conditions are ideal.

Of the various fungicides tried as control measures an organic fungicide 'Dithane' was found to be most effective, but 50% copper fungicides at 0.5% concentration gave a fair degree of control. The most important single factor however appeared to be the avoidance of damage to the plants.

It is suggested, therefore, that to protect shade tree nurseries from disease during monsoon conditions, high 'cadjan' covers (3 - 4 feet) should be provided to protect the plants from heavy rain whilst permitting free circulation of air.

This advice has already been given in connection with a leaf disease of Albizzia nursery plants(4), for which copper spraying was also advised. Thus a fortnightly round of copper spraying at double the concentration used for blister blight protection, might with advantage be adopted for shade tree nurseries, whilst monsoon conditions prevail.

References

(1) Gadd, C. H. Monographs on Tea Production in Ceylon No. 2, 1949, p. 59.

(2) Webster, B. N. Chemical and Biological Control of Insects in Perennial Crops—A Review. "*Tea Quarterly*" Vol. XXIII pp. 117 - 118 Dec. 1952.

(3) Gadd, C. H. Annual Report for 1948, Bulletin No. 30 of the Tea Research Institute of Ceylon, p. 32.

(4) Webster, B. N. *et al* Miscellaneous Notes, 3. "A note on pathological matters". "*Tea Quarterly*" Vol. XXIII pp. 84-85, Sept. 1952.

A NOTE ON YELLOW—MITE OF TEA

D. J. W. Ranaweera

Yellow mite of tea (*Hemitarsonemus latus* (Banks) Ewing) is the commonest of the mite pests of Ceylon Tea plantations. A partial failure of the monsoonal rains or fairly long intermittent periods of sunny weather appear to favour a build up of extensive and severe attacks. In the Dimbulla area attacks are generally most severe during the inter-monsoonal months of January - May and September - October.

Unlike purple, scarlet and red spider mites, which feed mainly on mature tea leaves, the yellow mite confines its feeding to young succulent leaves. Fields in the first year of recovery from pruning are particularly attractive and in such cases, if weather conditions are favourable to the mites' development, attacks may become widespread and devastating. In older fields, though attacks may become widespread during favourable seasons, infestation is usually confined to patches of tea or individual bushes.

Yellow mite infested leaves become brown and roughened on their under surface or carry two browned prallel streaks on each side of the mid-rib. The upper surface of the leaf becomes slightly wrinkled in appearance while the leaf itself may curl inwards. Heavily attacked leaves lose their normal glossy appearance and become browned and brittle. Such leaves defoliate.

The mite itself is difficult to see with the unaided eye but with a hand lens all stages of development of the mite may be observed on both surfaces of the infested flush points. The infestation is normally confined to the opening bud and the couple of leaves below it. The browned, brittle leaves are devoid of living yellow-mites.

The female mite is capable of laying up to an average of two eggs a day. These eggs hatch in 2 - 3 days into small larvae which become adults in about 3 days. The complete cycle from egg to egg being approximately 5 days. The adult may live for about two weeks during which period up to 28 eggs may be laid. This short life cycle enables a very quick build up of populations under favourable weather conditions.

Control Methods

Agricultural control. The most feasible method of control of yellow mite is in the removal of all mite susceptible leaf by severe plucking. Such leaf can be manufactured. Two to three rounds of fish leaf plucking, at fairly close intervals, are usually sufficient to control the mite attack. After such treatment, however, it is advisable to rest the bushes sufficiently long to form new shoots bearing a bud and 4 opened leaves before normal plucking commences again.

Chemical control. On tea recovering from pruning or in areas which are not in plucking—*i.e.* new clearings and resting tea—the application of a sulphur spray of which a number are available on the market is advised. The infested area should be sprayed with either 'Spersul' (I.C.I. Ltd.) 'Thiovit' (Baur & Co. Ltd.) or 'Shell Dispersible Sulphur' (Shell Co.) at a dilution of 1 lb. in 25 gallons water. Application rates of the suspension should be sufficiently high to wet both surfaces of the younger leaves. On tea recovering from pruning two applications, at weekly intervals may be necessary for effective control.

If the sulphur preparations are sprayed on to tea in plucking leaf *should on no account* be manufactured for at least 3 weeks after spraying. Sulphur causes objectionable tainting of the manufactured tea unless the stipulated time interval between spraying and harvesting is adhered to.

A NOTE ON DRIER CAPACITIES

E. L. Keegel

It is still customary to refer to the capacity of a drier in terms of pounds of made tea per hour presumably because it appears simpler to judge the performance of a firing machine from its output than from the pounds of moisture it is capable of evaporating. It is perfectly correct to do so provided, of course, the degree of wither of leaf is specified. Whereas the evaporative capacity of a drier is constant irrespective of the wither, all other conditions being equal, the intake and output varies considerably.

In view of the important bearing this question has on factory organisation, the following table has been drawn up to show the relationship between degree of wither and the capacity of a drier. For the purpose of illustration a drier rated to give 100 lbs made tea per hour under standard conditions has been chosen. By 'standard conditions' it is meant that the temperature of the inlet air is 190° to 195°F, that of the exhaust air 120° - 125°F, and that the moisture content of withered leaf is about 55% (equivalent to 45% outturn made tea to withered leaf.)

Type of wither	% outturn of made tea to withered leaf	POUNDS PER HOUR (APPROXIMATE)			
		(1) Output made tea	(2) Moisture evaporated	(3) Intake * fermented leaf	(4) Intake Withered leaf
Very Soft	40	80	116	196	202
	41	84	116	200	206
Soft	42	88	116	204	210
	43	92	116	208	214
	44	96	116	212	218
Medium	**45**	**100**	**116**	**216**	**222**
	46	104	116	220	226
	47	108	116	224	230
Hard	48	112	116	228	234
	49	116	116	232	238
Very Hard	50	120	116	236	242

* *Note:*—It is assumed that a 3% loss occurs in the rolling room.

The effect of degree of wither on the intake and output is clearly seen in these figures. One important point that will be noted is that for any variation in the moisture content of withered leaf the difference in the output is equal to that in the intake. That is to say, if a drier is expected to give 50 lbs made tea per hour more as the result of a harder wither its intake will also increase by 50 lbs of withered leaf per hour.

With the aid of this table it is a simple matter to determine the performance of any size of drier for varying withers.

Example:—

A 4′ drier is rated at 250 lbs made tea per hour under standard conditions. What is its capacity when dealing with soft withered leaf (42% outturn made tea to withered leaf)?

$$\text{Output} = \frac{250}{100} \times 88^{*} = 220 \text{ lbs made tea.}$$

$$\text{Intake} = \frac{250}{100} \times 210^{**} = 525 \text{ lbs withered leaf.}$$

* From column 1 in table
** From column 4 in table

Some further examples are given below:—

Rated output under standard conditions (per hour)	Multiple to be used	Percentage outturn of made tea to withered leaf	Lbs. per hour (App.)	
			Output made tea	Intake withered leaf
3′ drier 150 lbs	1.5	40	120	300
5′ drier 350 lbs	3.5	48	392	820
6′ drier 450 lbs	4.5	46	468	1020

The following example shows how to calculate the output of a drier for any degree of wither when its capacity is known under actual working conditions.

Suppose a drier delivers 200 lbs. made tea per hour for a wither corresponding to 43% outturn of made tea to withered leaf. The multiple to be used in this case is not $\frac{200}{100}$ but $\frac{200}{92}$ (From column 1 in Table, 92 is the figure against a 43% outturn).

This is equal to 2.18.

Therefore, the output to be expected under the same firing conditions for:—

a 40% outturn wither = 2.18 × 80 = 174 lbs. made tea per hour (approx.)
a 45% „ „ = 2.18 × 100 = 218 „ „ „ „ „ „
a 47% „ „ = 2.18 × 108 = 235 „ „ „ „ „ „

And the corresponding intake of withered leaf will be (from column 4 in table):—

40% outturn wither = 2.18 × 202 = 440 lbs. made tea per hour (approx.)
45% „ „ = 2.18 × 222 = 480 „ „ „ „ „ „
47% „ „ = 2.18 × 230 = 500 „ „ „ „ „ „

MINUTES OF THE MEETING OF THE BOARD OF THE TEA RESEARCH INSTITUTE OF CEYLON HELD AT THE OFFICES OF THE PLANTERS' ASSOCIATION OF CEYLON, ON FRIDAY, 30TH OCTOBER, 1953 AT 2-30 P.M.

Present:—Mr. R. C. Scott, C.B.E. (Chairman), Messrs. C. Dymoke Green, (Chairman, Agency Section Planters' Association of Ceylon), W. R. Vander Kiste (Chairman, Planters' Association of Ceylon), W. H. Attfield, A. W. R. Joachim, M.B.E., V. G. W. Ratnayake, M.B.E., M.P., G. K. Newton, W. Neal de Alwis, M.P., Errol Jayawickreme, J.P., U.M., D. E. Hettiarachchi, J.P., U.M., A. D. McLeod, B. C. V. Weeks and J. Lamb (Director & Secretary).

1. The Notice convening the meeting was read.

Messrs. H. S. Hurst and A. G. Ranasinha had intimated their inability to be present at the meeting.

2. **Minutes of Board Meeting Held on 17th July, 1953.**

The Minutes of Meeting of the Board held on 17th July, 1953, were confirmed subject to the inclusion of Mr. A. D. McLeod's name in the list of those present.

3. **Membership of the Board & Committees**

(a) Board.

It was reported that:

(i) Mr. V. G. W. Ratnayake, M.P., M.B.E., had been renominated by the Minister of Agriculture & Food as representative of the Small Holders for a further period of three years as from 15th October, 1952.

(ii) Mr. H. S. Hurst had been renominated by the Planters' Association of Ceylon for a further period of three years as from 21st April, 1953.

The Chairman expressed the Board's pleasure at their renomination and thanked Mr. B. C. V. Weeks for his services while he had acted for Mr. A. J. Dickson. Mr. Dickson had recently returned to the Island from leave but had not yet resumed his seat on the Board.

(b) Estate & Experimental Sub-Committee.

It was reported that Messrs. S. P. Vythilingam and A. J. Dickson had resumed their seats on the above Committee on their return to the Island from long leave.

4. **Minutes of the Meetings of the Estate & Experimental Sub-Committee held on 11th July & 17th October, 1953**

The Chairman reported that copies of the above minutes had been issued to members. He proposed that the Visiting Agent's report dated 16th July, 1953, item 6(a) on the agenda, be taken up for consideration along with the Minutes of the Sub-Committee. It had received the attention of the Sub-Committee at the latter meeting as would be noted from the Minutes.

In reply to a question raised by Mr. W. R. Vander Kiste, the Director (Mr. J. Lamb) gave details of the manna grass experiment which the Committee had agreed to terminate as it had proved unsuccessful.

5. Finance

(i) Government Loan.

The Chairman informed the members that the final instalment of Rs. 75,315/66 against the Rs. 1,000,000/- loan from Government had been paid on the 14th of September. The loan was therefore now fully liquidated.

The title deeds of St. Coombs Estate, which have been in Government custody, as security against the loan, had been called for.

(ii) T. R. I. Cess.

It was reported that receipts from cess for 1953 had, to the end of September, averaged Rs. 70,840/- as against Rs. 72,100/- for 1952. The total receipts to end September was Rs. 637,600/-.

(iii) Audit 1952 accounts.

The Chairman informed members that the audit of the 1952 accounts which had been delayed on account of Mr. Dias's absence on long medical leave had been completed on 9th October. The audit report was now awaited and was expected in good time for the next meeting of the Board.

6. Small Holdings Advisory Service

The Chairman reported that:—

The Minutes of the Meeting of the Small Holdings Sub-Committee held on 17th July had been issued to members.

A further meeting of the Committee was held that morning when among other matters the estimates for 1954 were discussed. These would be circulated to members in time for the next meeting of the Board at which the estimates for 1954 would come up for consideration.

The balance lying to the credit of the Service at the moment was approximately Rs. 80,000/-. The Committee had recommended that for the time being as much as was considered feasible should be placed in Government Treasury Bills with a view to investment in the Government Loan which was likely to be floated in the near future.

Mr. V. G. W. Ratnayake proposed and Mr. B. C. V. Weeks seconded that the recommendation be implemented. Agreed.

The Director suggested that as the Institute had been making use of the funds interest at the rate of $2\frac{1}{2}\%$ should be credited to the Small Holdings Service account. Agreed.

He then gave details of the issues of tea seed and fertilisers during the year by the Service to Small Holders in the various provinces.

	Central Province	*Southern Province*	*Uva Province*	*Sabaragamuwa Province*	*Total*
Tea seed (in maunds)	41	28	16½	14	99½
Manure (in tons)	105	7.7	9.7	10.6	141

Mr. de Alwis asked that these figures should be circulated amongst all Small Holdings Officers and Instructors.

7. Blister Blight

Contribution from Government. The Chairman informed that the fourth and final instalment of Rs. 150,000 was received from the Tea Controller on 5th September, 1953.

8. Any other Business

(a) **Guest House Charges.** The Chairman said that the charges for meals supplied to visitors at the St. Coombs Guest House were based on rates fixed at the inception of the Guest House. It had been pointed out that these rates were now out-of-date and required revision.

It was proposed that the rates be increased as follows:—

Breakfast	from Rs. 2/- to Rs. 2/50
Lunch	from Rs. 2/50 to Rs. 3/50
Afternoon tea	from Rs. 1/- to Rs. 1/25
Dinner	from Rs. 2/50 to Rs. 3/50
Hot bath	from 25 cts. to 50 cts.

and that these charges be notified in the "*Tea Quarterly*". Agreed.

(b) **Junior Staff Medical Fund.** The Chairman informed members that a memorandum dated 15th October had been received from the Junior Staff Association in which certain submissions had been made regarding medical benefits to the Junior Staff. The matter would be discussed by the Managing Committee of the Junior Staff Medical Fund and their findings put up to the Board for consideration at the next meeting.

(Sgd.) J. LAMB,
Secretary.

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